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DISTRIBUTION OF OPPORTUNITY FOR PARTICIPATION AMONG THE VARIOUS PUPILS IN CLASS-ROOM RECITATIONS

BY

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THE DISTRIBUTION OF OPPORTUNITY FOR PARTICIPATION AMONG THE VARIOUS PUPILS IN CLASS-ROOM RECITATIONS

I

PURPOSE OF THE INVESTIGATION

The final test for any educational procedure whether it be making, administrating, or teaching the course of study, is its effect on individual pupils in the school. The studies on school grading, size of classes, questioning, and other phases of class management show that the problem of reaching the individual child has been long before the teaching profession. Recently the demand for classes for unusual children, whether subnormal or supernormal, has given additional emphasis to its importance. In discussing the question with classes in principles of education and in working over the problems outlined above, the author has felt many times the need of definite knowledge, with regard to the exact nature of the practice in meeting this difficulty of reaching the individual child. To supply some of these data is the purpose of this investigation.

To state more definitely, the purpose of this investigation is to discover the distribution of opportunity for participation among the various pupils in class-room recitations. By participation is meant any response on the part of the pupil, whether in word or in action. It is used alternately with reciting and pupil recitation and as synonymous with them. The investigation was planned to secure data which could be organized about the following sub-problems: (1) How equally is the opportunity for participation distributed ? (2) What is the relation between the amount of reciting done and the general all-around ability of the pupil ? (3) What is the relation between the amount of reciting done in each subject and the special ability in this subject ? (4) How many opportunities for participation for class work does the pupil have per hour ? (5) What propor-

tion of the pupil's recitations are utter failures? (6) What is the relative amount of time given to talking as a form of participation as compared with other activities? (7) How many of the pupil's recitations consist of consecutive participations without the recitations of any other pupils intervening? (8) What is the length of pupil's recitations?

As will be seen in the treatment which follows, not all of this material has been utilized in this study.

II

HOW THE DATA WERE SECURED

The data which are incorporated in this study, and from which the generalizations of the treatment are drawn, were collected by the author and by principals, superintendents and supervisors in the field.

Records for one school (Speyer School, Teachers College, Columbia University) were made personally by the author. This school was used throughout the investigation as a source of suggestion, and as a control of methods of making records. Records were marked for three weeks before the directions which were to be sent to those who were to cooperate, were put in final form. The collecting of data then continued until, through a mistake of an assistant, some of the teachers were made aware of the nature and purpose of the investigation. This, unfortunately, closed the rooms of these teachers as sources of data to be used in this study.

Requests for cooperation were not sent out broadcast to principals, superintendents, and supervisors in the field, but to a selected group who are known to the author, personally or by recommendation, to be interested and competent in making statistical investigations. To each individual so selected, the following set of directions was sent, along with a letter which explained the purpose of the study:

SHEET 1. GENERAL DIRECTIONS

1. Teachers should know nothing of the data being collected nor their purpose.
   a. Should any teacher give evidence of understanding what is being done, this fact should be reported.
   b. If you have been putting special emphasis upon the equal distribution of opportunity for recitation amongst the various pupils in the class, this fact should be reported.
2. The seating plan method of marking recitation records is preferable, both because of the greater accuracy and because of the greater ease with which the record can be made.
3. Please send in all data collected. In case any record seems incomplete or inaccurate, mark it *incomplete* or *inaccurate*, but send it in.

4. As you will see upon examining the record sheets, Sheet 2 contains the actual directions for making records and should be thoroughly understood.

5. Two copies of Sheet 3 and of Sheet 4 are sent. Both should be marked at the same time, one being retained by you and the other returned to me.

6. I have attempted to put into these directions everything which could influence the usefulness of the data being collected. If, in your judgment, any element has been neglected, or if a re-statement of any part seems desirable, will you kindly notify me of the same at your earliest convenience?

SHEET 2. PROCEDURE WITHIN CLASS ROOM

I. Only one record should be taken on one sheet of paper.

II. Write at the top of the page as follows:

Grade	Class	Time	Date	Teacher
(1)	(Geography)	(10–10:30)	(Oct. 6th)	(Kinne)

III. Mark the name of each pupil absent during the recitation so:

——John S.——
(abs.)

IV. (1) a. For each recitation or request for recitation, mark O (under the name, in case the seating plan is used; after the name, in case the name list is used. See samples 1 and 2.)

b. In case the pupil responds by doing something, mark ▭. For example, in the case of the square marked under the name of Grace M., in Sample 1, this mark was made when Grace beat the white of an egg. The same mark (▭) is used for diagrams drawn on the board, etc.

c. When the pupil recites more than once without the recitation of any other pupil intervening, interlink the circles so: ⓪. Thus ⓪⓪⓪ denotes four recitations without the recitation of any other pupil intervening.

d. In case the pupil fails utterly, mark " F " inside the circle or square so: Ⓕ [F]. This may be omitted if found too difficult to make.

(2) When the whole class says or does something *as a class*, a circle or square may be drawn after the name of the grade. See at the top of the page in samples 1 and 2. This may be omitted if found too difficult to make.

V. If conditions are present which may influence the interpretation of the records made as described above, such a fact may be noted in writing on the back of the sheet on which the record was made.

VI. If the marks asked for under IV, (1), c, d; or IV, (2) are omitted, this fact should be noted and reported.

SAMPLE 1

O O ▭ O O

Grade 1	Reading	10—10:30	October 6th	Small
Frank H. O O	Anna M. O O O	John R. O O	Ferdinand C.	Lucy W. Ⓕ O O
Marie R. O O	Grace M. O ▭	Stewart S. O	Joseph N.	Marion R. ⓪
Robert V.	Harold N. Abs.	Egbert I. O	William A. O O	Hortense D. O O
Eugene C. O O	Florence E. O ⓪	Jacques P. O O	Gobin H. O O O	Margaret M. O ▭ O O

SAMPLE 2

O O ▭ O O

GRADE L	READING	10—10:30	OCTOBER 6TH	SMALL
Anna B.	O O O			
Egbert I.				
Eugene C.	O O			
Ferdinand G.				
Frank B.	O O			
Florence E.	O ⓓ			
Gobin H.	O O O			
Grace M.	O ▭			
Abs.				
Hortense D.				
Jacques P.	O O			
John R.	O O			
Joseph N.	O			
Lucy W.	Ⓕ O O			
Margaret M.	O ▭ O O			
Marie R.	ⓓ			
Marion R.	O O			
Robert V.				
Stewart S.				
William A.	O O			

As you can see, this method can be used satisfactorily only when

(a) A teacher calls the pupil by name each time,

(b) Or when the individual making the record is himself acquainted with all the pupils in the class.

SHEET 3. REPORT OF RECORD BEING MADE

In order that I may have information to aid me in the search for data, will you kindly underline the kinds of records which you will undertake to make? If possible, without too great inconvenience to you, I should like to have a record for each grade under your supervision, as described in 1 a-b-c-d, and 2. (See below.) If you cannot take time for this, data gathered as described in 3 will be very acceptable. (By each grade is meant one first grade, one second, etc.)

1. Records of a grade for one day. This may be made up:

   a. Of one whole day's observing. (Say Wednesday.) Please underline the grades for which you can make such records.

   Grade I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII.

   b. Of two half days. (Say Wednesday morning and Thursday afternoon). Please underline the grades for which you can make such records.

   Grade I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII.

   c. Of four quarter days in case there is a mid-morning and mid-afternoon recess. Please underline the grades for which you will make such records.

   Grade I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII.

   d. Of each subject on the program, the records being taken over a period of several days. (This period should not be more than three weeks.)

NOTE: (1) a, b and c are much more economical, as well as more satisfactory, since visits are more easily fitted to the program and with less waste due to changing from class to class.

(2) If the teacher in whose class a record is being taken is made nervous by long visits, c or d should be used instead of a and b.

(3) In case one or all of these records are made, please fasten the records with a clip and mark them (1-a, 1-b, etc., as the case may be).

2. Records of one subject in one grade for three or more successive days. For example, History, Grade VI, Speyer School, Monday, Tuesday, Wednesday, Thursday.
3. Records taken during the ordinary course of supervision. I should like to have at least three and if possible ten of those records for each grade.

SHEET 4. RANK OF THE PUPILS IN THE CLASSES FOR WHICH RECORDS ARE TAKEN

Please underline below the basis in your system upon which such ranking can be made.

1. The grades of the pupils for last year and for the months completed so far this year. Are these grades given in
   a. Numbers ?
   b. Letters ?
2. Ranking of the pupils by the teacher in order of their abilities. Below is a sample of such ranking.

GRADE VI. SCHOOL X.

a. Will L., Mildred L.
b. Edith W., Dorothy N., Wilma S., James K., Elizabeth B.
c. John S., Minnie S., Robert P., Dan D., Fred. P., Harry F.
d. Ruth R., Frank D., Nellie T., Wesley E.
e. Perry E.
f. Esther S.

NOTE 1: a, b, c, etc., denote a difference of considerable amount; otherwise the ranking is merely in order of ability. For example, Will L., Mildred L., and Edith W., are the three pupils ranking highest in ability.

NOTE 2: It must be kept in mind that this ranking is according to ability and not according to accomplishment. It is meant to give the teacher's judgment of what the child can do, rather than to furnish a record of what he has already done.

3. Has any test of general intelligence (such as the Binet tests) been given ? If so, are the results available for use in the ranking of pupils in the classes reported upon ?

Two copies of Sheet 3 and Sheet 4 were sent, one being marked "Please keep this Sheet," and the other, "Please return this Sheet at your earliest convenience."

As the duplicates of Sheets 3 and 4 began to come in, it became evident that a new Sheet 4 would have to be sent out, for the following reasons:

1. The variation in modes of grading was very great.
2. In many cases only four marks were used—1, 2, 3, 4, or a, b, c, d.
3. Even these grades could be sent only with great inconvenience to those cooperating.
4. The grades were not of a nature which would make possible the separation of the pupils into quartiles according to ability.

Since this division was necessary to the treatment to be followed in the study, a new Sheet 4 was sent out to guide in making the ranking desired. Below follows a copy of this sheet:

SHEET 4. RANK OF THE PUPILS IN THE CLASSES FOR WHICH RECORDS ARE TAKEN

I. The rankings of the pupils in ability, as described in II, A and B of this sheet, should be returned with the records. Each ranking should be plainly marked, as for example: School X, Grade 1, Ability in Reading, Miss Small; or School X, Grade 1, General Ability, Miss Small.

II. Ranking of the pupils by the teacher in order of their abilities. (This is very desirable.)

A. The rank of pupils in each grade in each subject for which records of recitations have been made, according to the following plans:

1. The rankings should be by the teacher who taught the class when the record was made.
2. Pupils should be ranked in order of ability. It must be kept in mind that this ranking is according to ability and not according to accomplishment. It is meant to give the teacher's judgment of what the child can do rather than to furnish a record of what he has already done.
3. In case the teacher cannot decide which of two pupils is the better, one should be placed arbitrarily above the other. A question mark should then be placed after each pupil whose position in the list is in doubt. This same arbitrary placing should be used in case more than two pupils seem to be equal in ability.
4. In case differences of considerable amounts appear between groups within the same class, this grouping can be indicated as in the sample below:

HISTORY—8TH GRADE, ROOM 31—SCHOOL X

a. Pearl, L.
b. John C., Lloyd M.
c. Mary T., Ruth, Carrie P.
d. Frances, L., John B., Anna K.
e. Sarah H., Charles T.
f. Paul A., Bess T., Susie S., Helen.
g. Minnie, Sam P.
h. Roy O., Mary W.

a, b, c, etc., denote differences of considerable amount. Otherwise, the ranking is in order of ability. For example, in this list, Pearl L., John C., Lloyd M., Mary T., and Ruth are the five best students ranking in the order given. Between groups a, b, c, etc., however, there is, in the opinion of the teacher, a greater difference than between the individuals within any of the groups.

B. The general ability of the class, ranked after the method described in II A.

This ranking is meant to be an answer to the question: How do the pupils of this grade rank in *general all-round ability?* This ranking, as in A-1, 2, 3, 4, is to be made according to what, in the teacher's opinion, the pupil has in the way of native ability. Below is the ranking in general ability of the same class which was ranked in History under II A.

General Ability—8th Grade—School X

a. Mary T., Pearl L., Lloyd M., Ruth.
b. Anna K., Carrie P., John C.
c. Paul A., Charles T.
d. John B., Sarah H., Frances L., Bess T.
e. Roy O., Susie S., Helen, Mary W.
f. Minnie, Sam P.

Obviously, Mary T., Pearl L., Lloyd M., Ruth, and Anna K. are, in the opinion of the teacher, the five best pupils. The difference between Ruth and Anna K. is greater than the difference betweeen Ruth and Lloyd M.

Records were made according to these directions in the following schools:

Bridgeport, Conn.
Training School, Colorado State Teachers College, Greeley, Colorado.
Denver, Colorado.
Boise, Idaho.
Decatur, Illinois.
Middleton, Indiana.
Bremen, Indiana.
Hancock, Michigan.
Training School, Kalamazoo State Normal School, Michigan.
Teachers College, Elementary School, School of Education, University of Missouri, Columbia, Missouri.
Mexico, Missouri.
Millville, New Jersey.
Paterson, New Jersey.
New York City, Public School 64.
New York City, Public School 86.
Teachers College, Columbia University, Horace Mann Elementary School, and Speyer School.
Chattanooga, Tennessee.
El Paso, Texas.
Princeton, Missouri.
Oswego State Normal School, New York.

For obvious reasons, the schools which sent in records are not identified in the discussion which follows, but are referred to by Roman numerals. The teachers are referred to by Arabic numerals. Below follows the teachers' numbers which correspond to the various schools. A complete key to the schools and to the teachers is on file in the library at Teachers College, Columbia University.

School	Teachers	School	Teachers
I	1– 10	XII	128–159
II	11– 32	XIII	160–175
III	33– 37	XIV	176–186
IV	38– 56	XV	187–190
V	57– 63	XVI	191–194
VI	64– 84	XVII	195–198
VII	85–100	XVIII	199–203
VIII	101–110	XIX	204–209
IX	111–117	XX	210–212
X	118–123	XXI	213–229
XI	124–127		

The author was at first disposed to include in the directions given on Sheet 2, three other requests: (1) That all pupils who volunteer, be marked so (V). (2) That the value of the contribution of each pupil recitation be indicated on a scale of one, two, three, four and five. (3) That each question asked by the pupil be indicated so (Q). These requests were not included because it was feared that the burden of doing so much might cause supervisors in the field to refuse to cooperate at all and because of the great difficulty of keeping all of these items in the mind of the recorder in such a manner as to insure that all the data be accurately taken. These problems, with many others which have been suggested during the progress of the investigation, have been left for future study.

All but six schools, namely, VIII, X, XV, XVI, XVII, XIX, and XXI, used the seating plan method of making the records. This fact adds to the reliability of the record because of the check afforded by having both the name of the pupil called upon and his position in the room, to guide the recorder.

All persons marked all data asked for on Sheet 2. The remarks asked for under V, Sheet 2, were highly satisfactory in affording a basis upon which to accept or reject records, and for the proper interpretation of records accepted. Some of the records contained additional information which will be referred to in the general discussion which is to follow.

III

RELIABILITY OF THE DATA

The first set of directions for collecting the data treated in this thesis was mailed October 21, 1913. The first record made by those who cooperated was made November 10, 1913. Most of the records were made during January, 1914. Even at the time when the first records were made, the teachers' habits of procedure must have been fairly well established and a reasonable opportunity given them to know the rank of the pupils, at least well enough to place them in the four quartile groups which have been used in making comparisons in this study. Records were received and embodied in this study which came in as late as March 14. As far as a particular time in the progress of the school year can influence the methods of teaching, these records should be representative of ordinary school work.

Records were made in the classes of 229 teachers in twenty-two different schools, in nineteen different systems, in eleven different states. As may be seen from the list of schools given in Part II, these schools represent a wide geographical distribution. Records were taken from the kindergarten, from each of the elementary grades, from the high school and from the college. Only a few, however, were taken for the kindergarten and for the college. The only principles of selection were the effort to secure a wide distribution of type and the effort to secure competent cooperation. It seems very unlikely that these efforts affected any selection among school systems which would render the data unreliable as adequately describing general school practice in large and small cities throughout the country.

All data received were used, which were clear, which were free from unusual circumstances indicated on the record (according to the request made upon Sheet 2 of the directions), and which were in the hands of the author in time to be embodied in this study. This precludes the possibility of selection by the author.

The material, moreover, is left as far as possible in its original form and is given separately for each grade and subject. All data not rejected for the reasons just stated, are given in the various tables, even though in some cases the number of records is too small to constitute conclusive evidence. These are given as the only data available to the author at this time, and to allow any, who care to do so, to fill out the very apparent gaps. The generalizations found in the last chapter are made from data which are ample enough to be practically conclusive. A very little thought would show how stupendous a task it would be to include in a single study sufficient data for an ample treatment of each of the headings under which the data have been grouped.

The likelihood of error on the part of recorders seems very small, considering the manner in which such a possibility was guarded against in the directions on Sheet 2. The only mistakes which may have crept in are those of omitting the mark for a pupil recitation or of placing a mark under the name of the wrong pupil. Even if the possibility of such omissions or mistakes be admitted, it is very unlikely that such omissions or mistakes should affect one quartile more than another.

All that is desired in this study is to show how the teacher distributed the opportunity for recitation among the various pupils according to their ability as she believes this ability to be. It is to measure the effect of her conscious method in so far as she has one, with regard to this distribution. Even if it be desired to know how this opportunity is distributed, according to the actual ability of the pupils, there are no tests at present more reliable than is the teacher's judgment, for the purpose of affording a basis upon which to rank the pupils in general all-round ability or in ability in special subjects.

IV

ORGANIZATION OF THE DATA

The first step in the organization of the data consisted in the transfer of the data from the record sheets to the ranking sheets. the number of recitations of each pupil in each subject being placed opposite his name in the ranking list. The following procedure was observed:

1. In case any ranking or record was obscure, it was laid aside until further information could be obtained. In case it contained obscurities which could not be cleared up by additional information, it was thrown out. Following under 2, is the only exception to this rule:
2. When the position of any pupil in the ranking sheet or his marking on the record sheet was obscure, his name and record were thrown out. In case the record showed many such obscurities, the whole record was thrown out.
3. Treatment of absentees: In case a single record was available for a given class, absentees were counted as not belonging to the class. The same rule was followed in cases where a pupil was absent in all recitations for which records were made. In case a pupil was marked as present at some of the recitations, but absent at others, he was given the average of his other recitations as his record for the days on which he was absent. In adding all recitations to find the total amount done by him, if the sum involved a fraction, an additional unit was given in cases which amounted to five-tenths (.5) or more. When the fraction amounted to less than five-tenths, it counted as zero. This method is somewhat crude, but is as likely to affect one part of the ranking list as another, and so has, practically, no influence on any of the quartile summaries as reached.
4. Quartile groupings for comparisons: The quartile was selected because it represents the mode of grouping which is probably the most conventional. Some summaries were arranged

also as tertiles and quintiles but seemed to add nothing to the information given by the quartile grouping. Grouping according to the normal curve of distribution also suggested itself, but the great increase in the labor of computation seemed to offer little additional return as a reward.

The conventional method of finding the quartile divisions was used, these divisions being taken as representing the first, second, third and fourth quarters of the class, counting from the end of the ranking list which represented the greatest amount of ability. When the quartile division point fell within a measure, the fractional part was taken. On account of the greater accuracy of this method, this procedure was felt to be valuable enough to offset the possible objection that this procedure necessitated splitting the recitation measures of one student. For example, with twenty-six pupils, with recitation records running 13, 9, 8, 10, 7, 2, 4, etc., the first quartile division falls within 4, the recitation records of the seventh pupil, making the sum of the pupil recitations of the first quartile, 51. When this sum was a complex fraction, the exact fraction was used in determining the percentages which are given in the various tables. The same method of finding quartile division points and percentages was used for comparisons by rank in special ability, by rank in general ability, and in amount of reciting done.

5. Percentages were found in the usual manner to the nearest tenth of a per cent.
6. Throughout the study participations by the class as a whole, i.e., in concert, are disregarded.

TABLE I. THE DISTRIBUTION OF OPPORTUNITY FOR PARTICIPATION, FOR INDIVIDUAL TEACHERS, BY GRADES

Teacher	No. of Records	Quartiles 1	2	3	4
GRADE I					
124	8	31.5	27.4	23.9	17.1
65	3	32.3	28.8	26.2	12.7
118	3	32.6	27.4	23.1	16.8
1	3	33.7	33.7	30.0	2.5
124	8	34.2	27.1	23.4	15.2
33	4	34.3	29.2	24.0	12.4
1	3	35.9	27.7	21.9	14.4
33	4	38.7	26.9	21.5	12.9
38	15	39.5	27.9	20.7	11.8
64	3	40.5	31.2	20.4	7.8
128	7	44.1	27.8	20.3	7.8
101	3	45.1	24.7	18.7	11.5
85	2	46.9	27.4	18.9	6.8
1	2	56.8	27.0	16.2	0.0
193	2	70.4	21.1	8.4	0.0
33	2	77.5	22.5	0.0	0.0
GRADE II					
67	3	32.8	31.3	23.4	12.5
34	2	33.9	29.0	22.6	14.5
162	2	34.7	27.0	22.4	15.9
177	3	34.9	25.6	23.7	15.8
34	2	37.5	32.1	16.9	13.4
161	2	37.6	26.3	21.2	14.8
102	2	37.7	23.8	23.8	14.6
88	2	40.0	32.0	22.7	5.3
66	3	40.1	30.7	21.4	7.8
2	6	40.2	27.1	20.7	11.9
186	3	40.8	29.4	23.0	6.7
39	10	40.8	27.5	19.1	12.6
125	7	41.2	30.1	18.3	10.4
34	5	41.7	27.3	18.9	12.1
205	2	43.5	25.3	19.3	11.8
2	6	44.8	27.8	16.8	10.6
2	6	44.9	28.6	18.3	8.2
206	2	45.5	25.5	17.3	11.7
103	4	48.8	28.6	19.0	3.6
193	2	55.1	31.9	12.1	0.8
GRADE III					
68	3	32.1	24.7	23.6	19.6
70	3	33.8	27.3	22.0	16.9
69	3	35.2	27.3	21.6	15.9
35	3	35.9	28.2	24.5	11.4
35	3	36.1	27.3	22.0	14.5
58	8	40.2	28.9	20.4	10.4
105	3	40.4	26.9	20.9	11.7
40	18	40.4	28.9	20.4	10.3
163	3	40.5	34.5	18.5	6.5
89	2	41.6	26.0	22.3	10.1
164	2	42.0	29.5	20.0	8.5
99	2	42.2	28.9	17.8	11.1
3	4	43.9	29.7	19.8	6.6
104	5	44.7	30.6	18.8	5.8
3	3	48.1	28.1	19.4	4.3
35	5	64.2	24.2	11.6	0.0
GRADE IV					
91	2	31.2	26.6	22.9	19.3
4	5	35.4	27.8	20.9	15.8
126	6	36.1	26.2	21.3	16.4
4	4	36.1	28.3	21.9	13.7
179	4	38.3	30.4	21.9	9.4
165	2	38.8	30.9	20.1	10.2
126	6	43.5	25.3	18.5	12.7
41	10	44.6	27.2	20.3	7.9
180	3	46.1	27.9	19.0	7.0
106	4	46.8	31.4	14.7	7.1
107	4	46.9	28.8	19.7	4.5
72	3	47.8	26.5	16.1	9.5
71	3	52.6	30.7	16.2	0.5
KINDERGARTEN					
38	3	38.3	25.9	20.7	15.0
GRADE V					
74	3	33.4	26.7	23.7	16.2
5	4	36.2	27.6	22.4	13.8
5	6	38.8	27.7	19.6	13.8
19	3	39.0	31.0	21.0	9.0
42	17	41.6	27.0	19.4	12.0
184	3	41.8	25.6	23.2	9.3
90	3	44.0	32.9	17.9	5.1
119	2	44.1	27.0	18.7	10.1
73	3	44.4	25.0	18.1	12.5
168	2	47.5	27.7	18.6	6.2
170	3	49.4	28.9	16.1	5.5
181	4	50.0	28.2	17.5	4.2
108	4	55.0	28.1	16.5	0.3
167	2	57.6	27.1	10.9	4.3
192	2	60.0	29.1	9.1	1.8
109	3	60.2	22.7	15.3	1.7
GRADE VI					
94	2	30.4	26.3	23.8	19.5
6	5	33.2	26.0	22.6	18.2
92	2	34.3	25.4	22.5	17.8
43	28	34.5	25.9	21.5	18.0
110	5	35.2	27.8	22.2	14.7
6	3	36.5	27.0	22.4	14.0
127	3	38.1	31.6	25.0	5.3
75	4	38.6	28.1	21.8	11.5
182	3	45.3	29.1	18.2	7.4
61	3	45.3	28.0	18.1	8.6
192	2	47.3	32.6	14.9	5.2
127	4	50.0	28.6	16.5	4.9
COLLEGE					
203	11	46.9	29.8	15.9	7.4
199	16	47.7	24.5	18.6	9.2
202	9	48.4	23.7	18.0	9.9
201	25	53.7	31.0	12.8	2.4
200	18	57.2	25.4	12.2	5.2
GRADE VII					
77	3	36.1	26.3	21.0	16.5
7	6	36.6	27.3	21.1	14.9
7	4	38.0	29.9	20.9	11.1
62	6	39.3	27.0	20.6	13.1
78	3	40.0	28.6	21.4	9.9
76	3	41.2	28.9	18.4	11.5
44	15	47.2	26.0	16.7	10.0
194	2	47.5	20.9	18.6	12.9
GRADE VIII					
80	3	32.7	27.3	23.5	16.5
183	2	35.0	29.1	22.3	13.5
185	3	36.3	27.4	22.1	14.1
79	3	36.7	27.5	20.0	15.8
210	2	39.5	26.1	21.6	12.8
8	6	40.7	29.6	20.4	9.3
96	2	42.9	27.3	16.4	13.3
8	6	46.8	26.6	17.7	8.9
45	25	50.4	21.9	18.7	9.0
81	3	52.0	29.3	15.3	3.3
121	4	61.9	26.8	11.3	0.0
GRADES IX–XII					
97	2	33.3	31.2	23.0	12.4
14	3	38.4	30.0	20.9	10.6
86	2	39.6	30.2	21.5	8.7
197	3	39.8	29.9	20.4	9.9
120	3	39.8	31.0	18.0	11.2
21	2	41.9	24.2	20.4	13.5
87	2	44.2	24.4	19.8	11.6
11	3	46.4	27.2	16.2	10.2
196	3	51.4	24.3	17.5	6.7
28	2	53.0	23.3	15.7	7.9
195	4	53.4	29.5	17.0	0.0
20	4	54.0	27.4	14.1	4.4
123	2	54.2	26.4	14.3	5.1
15	2	55.6	25.4	14.3	4.7
198	5	60.1	28.2	11.7	0.0
122	3	67.2	23.9	8.2	0.7

This table should be read: In the class of teacher 124, in grade I, for which 8 records were made, the quartile of the class doing most reciting, did 31.5% of all the reciting done by the class, the second quartile, 27.4%; the third quartile, 23.9%; and the fourth quartile, 17.1%; etc.

V

THE DISTRIBUTION OF PARTICIPATION BY GRADES*

The pupils in all classes for which there were two or more records were ranked in order of the number of participations (see note). By participation is meant any response on the part of the child whether in words or in action. When " Pupil recitation " is used, it is used as a synonym for participation. Table I shows the per cent of the total participating done by

* The number of recitations or participations was the only measure of amount available for all schools. It may be asked whether this constitutes a true measure of amount, since a pupil really may say or do more in one long participation than in a number of shorter ones. It is interesting to note, however, that from evidence which was secured from stenographic reports of lessons, the correlation between the amount of reciting as measured by the number of pupil's recitations and the amount of reciting done during each pupil recitation as measured by the number of words spoken, is a plus correlation; the correlations (Spearman foot-rule) being as follows:

Grade	Number of Lessons Reported	Correlations
1	3	.0
2	3	.105
3	7	.107
4	8	.56
5	3	.603
6	7	.444
7	8	.338
8	4	.354

The reports from which these correlations were secured, were not complete descriptions of the recitations of the various pupils, since in some cases the names of some of the pupils could not be secured by the stenographer, so that their participations could not be identified, but had to be marked " Pupil." The correlations given above were those made from the participations of those pupils whose names were secured and so do not represent in any case the entire class. It seems safe to say, however, that it seems very unlikely that pupils reciting most frequently recite for shorter periods than do those reciting less frequently. On the contrary, it seems very probable and particularly so in the upper grades, that the pupils who recite most frequently also say or do most when they do recite.

Since these stenographic reports were taken in Speyer School, which is an experimental school, and is not representative of public schools throughout the country, the author has made no attempt to use this information in generalizing with regard to the same question in the case of the other teachers for whom data are given in this study.

the first, second, third, and fourth quartiles of the pupils so ranked.

The median is used throughout this study as the measure of the central tendency among the percentages of each quartile. The reasons for its use are those usually given; namely, its meaning is unambiguous and it is little affected by extreme measures. Below follow the medians for Table I.

TABLE II

Grade	Quartiles			
	1	2	3	4
1	39.1	27.4	21.1	11.7
2	40.5	28.2	20.0	11.9
3	40.5	28.2	20.4	10.4
4	43.5	27.9	20.1	9.5
5	44.2	27.6	18.4	7.6
6	37.3	27.9	22.0	12.8
7	39.7	27.2	20.8	12.2
8	40.7	27.3	20.0	12.8
9–12	48.9	27.3	17.3	8.3
Median	40.5	27.6	20.1	11.7

The question of reliability as it applies to the whole of the data has been treated in the preceding section and so need not be considered further here. A special question of reliability arises with regard to the data in this table, namely, that of inferring from two, three, or four records of a class, the true distribution of participation in this class, which would be shown by a greater number of records. It would have been very desirable to have ten or more records of each teacher whose practice is represented by the percentages in the table. Because of the great amount of time taken to secure these records, however, not all who cooperated could send this number. It became a problem, therefore, to determine the variability of percetnages representing a small number of records, from those taken from a number of records sufficient to give an adequate representation of the teacher's practice. This problem was found to be too complex to be solved in this study, and it involved influences which could not be separated in the data collected. For practical purposes, however, the influence of these small measures may be disregarded in determining the true median as can be seen by the fact that when they are thrown out, the medians or averages of the quartiles are little affected. The lack

of influence of these small measures in changing the median, might be inferred from the fact that they are well scattered throughout the distributions in Table I, there being as many percentages, taken from two or three records, below the median percentages as above; whereas if the percentages made from a small number of records had an influence in lowering or raising the medians of this table, they should be found chiefly above or below the medians, as the case might be. The medians of the medians for each grade as made respectively from two or more, three or more, and four or more records, are given below:

TABLE III

Number of Records	Quartiles 1	2	3	4
2 or more.....	40.5	27.6	20.1	11.7
3 or more.....	40.8	27.9	20.4	10.4
4 or more.....	41.6	27.8	19.8	11.1

The medians which are used in the discussion which follows are those found from the percentages computed from two or more records. The conclusions would be no different for practical purposes if either of the other two sets of medians had been used.

The measure of variability used is Q, the semi-inter-quartile range. The Q's for each quartile of each grade are given below:

TABLE IV

Grade	Quartiles 1	2	3	4
1	6.0	.7	2.5	4.5
2	3.3	1.9	2.2	3.0
3	3.6	1.1	1.5	3.3
4	5.4	1.9	1.4	3.3
5	6.1	.9	2.0	4.0
6	5.4	1.4	2.2	5.8
7	3.5	1.3	1.3	1.7
8	7.1	1.3	2.9	2.6
9–12	7.2	2.8	3.1	3.2
College	3.0	2.7	2.6	2.0

As shown by this table, the variability is greatest in the quartiles doing most and least reciting, and least in the two middle quartiles.

Judging from the evidence in Table I, and using the above medians of the medians of percentages made from two or more records, for purposes of generalization, one would say that the fourth of the class doing most reciting does about one and three-

fifths of a pro rata share, (a pro-rata share being twenty-five per cent of all the reciting,) the second fourth about one and one-ninth of a pro-rata share, the third fourth about four-fifths of a pro-rata share, and the low fourth less than half of a pro-rata share; the percentages of a pro-rata share being respectively, 162.0, 110.4, 80.4 and 46.8. The first quartile does about four times as much reciting as does the fourth. The significance of the inequality of this distribution will be taken up later in this study.

VI

THE RELATIONSHIP BETWEEN GENERAL ALL-ROUND ABILITY AND AMOUNT OF PARTICIPATION

The preceding section considered the mere fact of inequality of distribution without taking into account any relationship between this inequality and any other fact. The problem of this section is to determine what the relationship is between general all-round ability and the amount of participation. General all-round ability is used in the sense defined in Part 2. The facts of this relationship are given in Table V.

The relationship between general all-round ability and the amount of participating, is shown by comparing the first, second, third, and fourth quartiles in ability with the amount of reciting done by each. The reasons for using the quartile and the methods of determining it, were those given in Part IV, Section 4. By the first quartile, is meant the best fourth of the class in general all-round ability; by the second quartile, the second fourth of the class in general all-round ability, etc., the pupils being ranked as described under II (B) of the directions on Sheet 4. The amount of reciting done by each quartile is expressed as a percentage of the amount of reciting done by the whole class. For each class in this table, there are given the percentages corresponding to each quartile, the number of records from which these percentages were determined, the number of the pupils in the class, and the key number of the teacher of the class. By a class, is meant the administrative unit ordinarily referred to as a class, as for example, Class A, Grade VI. Where two or more measurements appear for the same teacher, this is descriptive of the fact that this teacher had charge of that number of separate classes.

The median is used to show the central tendency of the quartile percentages of all the teachers in each grade.

Three possible methods of finding these central tendencies suggest themselves:

1. Take each percentage as the most reliable measure of the quartile of the class it represents without regard to the number of records from which this percentage was made. This has the disadvantage of giving the same weight to a percentage made from a single record (and which may, therefore, be an exceptional record,) as to percentages made from a large number of records, (and which, therefore, more probably represent the actual practice of the teacher). It will be noticed by a study of Table III, that most extremely low or extremely high measures are those which are made from one record of a class.

2. Weight each measure by counting it a number of times equal to the number of records from which it is made. This offsets the difficulty mentioned under 1, but has the disadvantage of giving too much influence to School IV, for which the author personally made records, and for which a great number of records were made. Consequently, the position of the percentage representing this school would be very influential in determining the median for that grade.

3. As a compromise, weight each measure by using the square root of the number of records from which the percentage was made. Proceed then as in 2. This method has a tendency to offset the difficulties mentioned above under 1 and 2, and probably approaches most nearly the true measure of the actual practice in the field.

When the medians for each grade were found according to the methods described under 1 and 3, very little difference was found between the medians so obtained. In the first quartile, four differences are zero, three differences are less than one, and two differences are less than two. In the second quartile, three differences are zero, five differences are less than one, and one difference is less than two. In the third quartile, four differences are zero, three differences are less than one, and two differences are two or less. In the fourth quartile, two differences are zero, four differences are less than one, two differences are less than two, and one difference is less than four. In only one case, that of the fourth grade, does the difference amount to more than two (the median for the fourth quartile in this grade being 20.9, as found by method 1, and 17.2 as found by method 3). For practical purposes, therefore, and because of the greater simplicity, the medians found as described under 1 are the medians

TABLE V. THE RELATIONSHIP BETWEEN GENERAL ABILITY AND AMOUNT OF PARTICIPATION, FOR INDIVIDUAL TEACHERS, BY GRADES

Teacher	No. of Pupils	No. of Recitations Recorded	% of reciting made by each quartile			
			1	2	3	4
GRADE I						
64	21	3	14.8	26.5	25.6	33.1
85	25	2	22.6	30.6	27.4	19.3
160	44	1	25.0	25.0	27.2	22.7
124	16	8	25.3	25.3	22.6	26.7
65	9	3	26.2	24.7	23.5	25.5
176	40	1	26.7	26.7	22.5	24.1
33	21	4	26.9	26.8	21.5	24.7
124	32	8	27.3	24.1	27.8	20.7
1	11	5	28.2	32.0	17.4	22.3
33	20	4	28.9	25.6	19.0	26.4
1	9	4	29.1	33.2	18.8	18.8
33	41	2	29.1	30.8	20.0	20.0
1	20	3	32.4	51.3	5.4	10.8
101	40	3	32.8	18.6	23.6	25.0
38	20	15	37.3	26.6	22.3	13.7
159	18	8	40.0	20.0	21.9	18.1
193	12	2	49.3	28.2	5.6	16.8
GRADE II						
125	40	7	16.0	19.7	24.7	39.6
34	24	3	19.7	30.3	23.2	26.8
161	44	2	20.6	24.1	27.6	27.6
177	26	3	24.3	28.3	25.7	21.7
34	19	3	25.8	22.6	27.4	24.2
39	20	10	25.9	33.9	24.1	16.0
208	11	1	26.2	23.8	28.6	21.4
162	38	2	26.4	27.6	24.0	22.0
67	12	3	26.6	25.0	23.4	25.0
205	14	2	26.9	35.5	18.3	19.3
34	43	5	27.8	21.0	22.9	28.3
102	31	2	29.6	22.7	20.4	27.3
88	26	2	30.0	23.3	29.3	17.3
2	25	6	30.3	20.9	24.8	23.9
209	7	1	30.4	20.9	15.5	33.1
186	29	3	30.7	25.2	17.8	26.2
2	22	6	30.9	18.0	19.4	31.6
66	13	3	31.9	36.5	15.2	16.3
103	32	4	32.1	22.6	17.8	27.4
206	12	2	42.7	24.5	16.4	16.4
204	15	1	46.4	30.0	12.7	10.9
193	12	2	48.3	.9	30.1	20.7
37	43	1	56.2	12.5	28.1	3.1
GRADE IV						
71	21	3	20.8	33.3	18.9	27.1
166	39	1	22.7	19.1	28.2	30.0
126	30	6	26.9	30.8	25.0	17.2
165	48	2	26.9	21.7	28.0	23.4
179	31	4	26.9	30.9	26.1	16.1
91	37	2	27.5	23.1	25.8	23.6
4	20	4	27.8	23.4	27.8	20.9
4	23	4	30.0	19.5	25.5	25.0
180	35	3	33.5	23.6	26.0	16.9
126	16	6	34.4	24.6	16.4	24.6
41	20	10	35.7	23.3	24.3	16.7
191	15	1	36.6	29.1	19.4	14.8
72	20	3	36.8	26.5	22.8	13.9
107	24	4	43.9	25.7	16.7	13.6
GRADE V						
181	42	4	21.1	24.9	24.6	29.4
170	42	3	23.3	31.9	26.4	18.4
167	46	2	26.2	30.9	14.3	28.6
74	15	3	26.8	21.6	33.8	17.8
184	43	3	27.1	27.4	26.5	18.9
168	46	2	27.2	28.1	18.2	26.4
192	10	2	27.3	5.5	30.9	36.3
73	14	3	27.4	17.7	27.0	27.8
90	30	2	28.6	32.9	19.7	18.8
5	25	4	29.0	24.2	26.2	20.5
5	23	6	29.6	20.4	32.3	17.6
60	28	3	32.2	25.4	22.0	20.3
169	34	1	33.3	26.1	16.7	23.8
109	29	3	35.2	25.0	12.5	27.3
108	29	4	36.1	23.8	14.2	25.7
42	20	16	36.7	21.0	21.9	20.4
GRADE VII						
77	16	3	25.6	24.1	21.8	28.6
10	21	2	25.7	24.3	26.1	23.9
10	23	1	25.9	25.3	21.0	27.7
7	19	1	26.4	30.7	24.3	18.6
8	21	2	26.6	31.4	23.9	18.0
76	17	3	27.2	21.8	30.1	20.8
7	21	6	27.3	26.9	25.3	20.5
62	27	6	27.8	26.9	22.6	22.7
78	22	3	28.1	26.6	30.1	15.1
9	20	1	32.2	29.0	19.4	19.4
63	25	1	32.8	23.4	29.6	14.1
7	24	4	35.5	28.2	17.9	18.3
8	24	1	38.3	25.0	23.3	13.3
7	23	1	38.5	29.7	16.3	15.5
194	13	3	39.5	14.6	25.6	20.2
44	21	15	40.6	31.9	14.8	12.7
9	24	1	50.0	38.5	3.8	7.7
GRADE VIII						
183	24	2	21.8	30.7	21.8	25.7
7	37	1	22.8	31.5	27.1	18.5
80	11	3	23.5	23.5	28.4	24.6
7	35	1	24.1	25.9	22.3	27.7
79	16	3	25.0	21.7	30.8	22.5
210	21	2	25.2	32.3	23.1	19.3
96	36	1	28.0	28.0	24.0	20.0
81	22	3	28.7	22.0	14.0	35.3
183	28	1	29.4	29.4	29.4	11.8
10	37	2	31.8	32.8	18.9	16.4
10	35	2	32.5	18.6	26.3	22.5
8	37	2	33.4	37.9	16.8	11.8
8	36	2	35.5	16.4	26.6	21.5
95	34	2	36.7	19.5	25.8	18.0
185	24	1	38.5	15.3	23.1	23.1
9	37	1	38.9	41.2	9.2	10.7
45	19	26	44.1	21.9	20.8	13.1
9	35	1	62.8	18.6	16.9	1.7

TABLE V. THE RELATIONSHIP BETWEEN GENERAL ABILITY AND AMOUNT OF PARTICIPATION, FOR INDIVIDUAL TEACHERS, BY GRADES—*Continued*

Teacher	No. of Pupils	No. of Recitations Recorded	% of reciting made by each quartile			
			1	2	3	4
GRADE III						
163	43	2	20.3	29.7	26.7	23.3
105	29	3	20.7	29.3	29.0	20.9
3	23	4	22.4	30.3	24.1	23.1
70	12	3	23.4	28.6	22.1	25.9
69	16	3	23.9	22.7	28.4	25.0
35	17	3	24.3	24.3	24.8	26.5
35	18	3	25.2	31.9	23.8	19.0
89	33	2	25.6	29.7	24.7	19.9
3	21	5	27.3	33.7	22.1	16.8
164	37	2	29.2	33.8	14.5	22.5
58	29	8	30.5	33.4	18.1	18.0
68	7	3	31.8	25.0	22.6	20.6
104	28	4	32.9	32.9	16.5	17.6
40	20	18	33.9	29.1	22.6	14.3
35	35	4	36.5	30.2	16.6	16.6
99	12	2	35.6	33.3	17.8	13.3
103	35	1	27.3	36.3	27.3	9.1

Teacher	No. of Pupils	No. of Recitations Recorded	% of reciting made by each quartile			
			1	2	3	4
GRADE VI						
92	13	2	23.7	24.6	24.6	27.1
173	37	1	23.9	35.2	22.7	18.2
110	24	5	25.0	25.6	25.0	24.4
93	41	2	25.8	26.0	26.5	21.7
6	20	5	25.9	25.5	24.0	24.5
174	41	1	27.0	28.4	33.1	11.5
94	18	2	27.5	24.2	28.3	20.0
126	24	4	28.9	18.4	25.0	27.6
171	40	1	31.5	20.2	21.6	26.7
43	20	28	31.7	24.1	20.0	24.2
61	30	3	32.3	33.2	21.1	13.4
126	24	6	33.4	21.9	19.2	25.4
74	19	3	35.5	23.7	23.9	16.8
192	22	2	37.1	24.5	16.5	21.8
166	38	3	37.9	18.8	23.6	19.6
172	41	1	38.5	24.0	15.4	22.1
175	44	1	38.8	22.2	23.6	15.3

Teacher	No. of Pupils	No. of Recitations Recorded	% of reciting made by each quartile			
			1	2	3	4
GRADES XI–XII						
24	20	1	5.6	49.5	44.8	0.0
31	13	1	12.0	36.3	31.0	20.7
17	13	1	20.7	44.1	17.6	17.6
25	17	1	24.1	29.6	30.5	15.7
18	26	1	25.0	39.3	29.7	5.9
87	16	2	25.6	26.7	27.9	19.8
12	27	1	26.3	18.3	18.7	36.6
97	18	2	27.6	27.6	25.2	19.5
19	21	1	27.6	25.5	29.7	17.2
20	26	4	29.3	36.0	15.5	19.1
21	18	2	29.6	30.4	21.1	18.8
26	19	1	29.7	29.7	18.7	21.8
13	24	1	29.9	31.0	18.4	20.7
28	20	1	30.5	21.9	29.3	18.3
22	10	1	30.8	33.3	19.2	16.6
23	12	1	31.2	15.6	15.6	37.5
29	21	1	31.3	22.1	33.7	12.8
14	27	1	31.4	26.1	23.9	18.6
30	18	1	32.5	20.0	31.2	16.2
98	22	2	33.0	26.9	27.7	12.3
14	25	3	33.6	26.0	23.9	16.5
29	27	1	37.2	27.2	19.4	16.1
32	14	1	37.5	37.5	21.4	3.6
27	6	1	42.1	23.7	23.7	10.5
15	20	1	42.8	21.5	25.0	10.8
11	22	3	43.1	24.5	21.6	10.8
17	15	1	43.9	24.5	6.1	25.5
15	29	1	44.4	22.2	27.7	5.6
213	22	1	45.0	31.0	17.0	7.0
28	19	1	46.3	14.8	20.4	18.5
28	25	2	47.7	16.9	22.1	13.2
15	25	2	53.9	12.7	22.2	11.1
16	24	1	60.6	9.1	15.1	15.1

This table should be read: In the class of teacher 64, grade I, consisting of 21 pupils, and for which 3 records were made, the quartile ranking highest in general ability did 14.8% of all participating done by the class; the second quartile, 26.5%; the third quartile, 25.6%; and the fourth quartile, 33.1%, etc.

which appear in Table VI, and which are used in the discussion which follows.

TABLE VI

PERCENTAGE OF RECITING DONE BY EACH GRADE, MEDIAN MEASURES

GRADE	QUARTILES			
	1	2	3	4
1	28.2	26.6	22.3	22.3
2	29.6	23.8	23.4	23.9
3	27.3	30.2	22.6	19.9
4	28.9	24.1	25.3	19.1
5	28.0	24.6	23.3	22.2
6	31.5	24.2	23.6	21.8
7	28.1	26.9	23.3	18.6
8	30.6	24.7	23.1	19.7
9–12	31.3	26.1	22.2	16.5
AVERAGES:	29.3	25.7	23.2	20.4
Q:	1.25	1.25	.4	1.55

NOTE:—Three records for the kindergarten give the following percentages: first quartile, 32.1; second quartile, 26.0; third quartile, 20.2; fourth quartile, 21.7.

Several facts of importance should be pointed out with regard to the preceding table. In using the average of the medians, as a most convenient single figure to describe the quartiles in the table, it may be pointed out that the first quartile does, roughly, about one and two-fifths times as much participating as does the lower quartile. The second quartile does slightly more than an equal share, the third quartile slightly less than an equal share of participation, the actual averages being 29.3, 25.7, 23.2, 20.4.

In no case does the median measure of the amount of reciting done by the best quartile fall below an equal share, and in no case does the sum of the percentages representing the reciting of the first and second quartiles fall as low as the sum of the percentages representing the reciting done by the third and fourth quartiles combined.

There is also a tendency for the per cent of reciting done by the best quartile to increase with an advancing grade, so that pupils in the upper grammar grades do more than those in the primary or intermediate schools, etc. The amount of reciting done by the second and third quartiles remains fairly constant throughout the grades, with this exception: that where the first quartile is relatively low in the percentage of reciting done, the second quartile is likely to be high, and vice versa.

As might be expected from the tendency in the first quartile, the amount of reciting done by the fourth quartile grows increasingly less with an advance in grade, so that in the high school, the best quartile does almost twice as much reciting as does the poorest quartile. This fact is shown still more clearly in the following table which gives for each grade, the seventy-five percentile and twenty-five percentile for the best and poorest quartiles of the class in ability.

TABLE VII

Grade	First Quartile		Fourth Quartile	
	75 Per.	25 Per.	75 Per.	25 Per.
1	32.4	26.2	25.0	18.7
2	31.9	25.9	27.4	17.3
3	31.8	23.9	23.1	16.8
4	35.7	26.9	24.6	16.1
5	32.8	27.0	27.6	18.9
6	35.5	25.9	24.5	18.2
7	38.3	26.6	20.8	15.1
8	36.7	25.0	23.1	13.1
9–12	42.8	27.6	19.1	11.1

The 75 percentile in each case represents the point above which one-fourth of the cases rise; the 25 percentile, the point below which one-fourth of the cases fall. In the case of the quartile doing most reciting, the position of the point which marks the 75 percentile rose farther away from the median and is represented by a larger percentage, with an advance in grade. On the contrary, in the quartile doing least reciting, the 75 percentile is represented by a percentage which grows increasingly less with an advance in grade. The 25 percentile is represented by a percentage which likewise decreases until in the high school one fourth of the cases fall below 11.1.

The cases of teachers whose percentages rise above the 75 percentile or below the 25 percentile, cannot be explained by the influence of single measures in allowing very unusual class recitations to be incorporated in the distribution, thus making it possible for unusually high and low percentages to increase the variability. The number of high and low percentages in each quartile which have been made from a large number of records, indicates that in the case of a considerable proportion of teachers, the amount of reciting done by the best quartile does exceed this 75 percentile division and the amount of reciting done by the poorest quartile does fall below the 25 percentile division.

The measure of variability used is a modification of Q, the semi-inter-quartile range. From a glance at the measure given in Table V, it will be seen that the distribution is skewed. Accordingly, two measures of variability are used which the author has called Q_1 and Q_2, Q_1 being used to represent the range between the median and the 25 percentile; Q_2 being used to represent the range between the median and the 75 percentile. These measures of variability for each grade are given below:

TABLE VIII

Grade	Quartile 1		2		3		4	
	Q_1	Q_2	Q_1	Q_2	Q_1	Q_2	Q_1	Q_2
1	2.0	4.2	1.6	4.0	3.3	1.3	3.6	2.7
2	3.7	2.3	2.9	4.5	5.6	3.7	6.6	3.5
3	3.4	4.5	1.1	3.1	4.5	2.2	3.1	3.2
4	2.0	6.8	1.0	5.0	5.9	.8	3.0	5.5
5	1.0	4.8	3.3	3.2	5.8	3.5	3.3	5.4
6	5.6	4.0	2.0	1.4	2.5	1.4	3.6	2.7
7	1.5	10.2	2.6	2.8	3.9	2.3	3.5	2.2
8	5.6	6.1	5.2	6.8	4.2	3.2	6.6	3.4
9–12	3.7	11.5	4.2	4.9	3.5	5.7	5.4	2.6

It will be noticed that in the first and second quartiles the variations below the median are much smaller than the variations above it, the median of the variations being 3.4 for Q_1, and 4.8 for Q_2 in the first quartile, 2.6 for Q_1 and 4.0 for Q_2 in the second quartile. In the third and fourth quartiles, on the other hand, the variations below the median are larger than the variations above it; the median of the Q_1's being 4.2 in the third and and 3.6 in the fourth quartile, and of the Q_2's, 2.3 in the third and 3.2 in the fourth quartile. The interpretation of the difference between the two Q's is probably this: it is very unlikely that the pupils of ability can be kept much below an equal amount of participation; on the other hand, in cases where the conduct of the class is determined largely by the interest and initiative of the pupils, the amount of reciting done by this quartile may run very high. In the case of the third and fourth quartile, it seems unlikely that even the best drillmaster can get much more than an equal share of participation on the part of the duller pupils, while, on the other hand, in the case of teachers who leave the conduct of the class largely to the initiative of the pupils, these poorer pupils may do a very small proportionate part of the work of the class.

Variability among the various teachers within any grade is low when the small number of records for each teacher is taken into consideration. The sum of Q_1 and Q_2 is the range between the 25 percentile and the 75 percentile and therefore contains half the cases. As would be expected from the fact that the variability above the median is greater than that below it, in the case of the first two quartiles, and less in the case of the two lowest quartiles, half the cases can be gotten within a much smaller range by selecting the range toward the end of the lesser variations. For example, in the case of the first quartile, in Grade VII, the inter-quartile range lies between 26.6 and 38.3, and is equal to 11.7. Half the cases are contained, however, between 25.6 and 28.1, with a range of 2.5.

Variability expressed by the Q_1's and Q_2's is somewhat larger than the true variability among teachers (which would be shown by a larger number of records for each teacher), owing to the fact that single records make possible the inclusion of very unusual class procedures in which the amount of the reciting done by each quartile may run very high or very low. Even allowing for the tendency for the percentage of reciting done by the first quartile to run higher as the grades advance and for the per cent of reciting done by the fourth quartile to become less with an advance in grade, the amount of variation among the medians of the various grades is remarkably small, as is shown by the Q's of the quartiles. The gross range of distribution for the medians which represent the tendencies for each grade, is from 27.3 to 31.5 in the first quartile; from 23.8 to 30.2 in the second; from 22.2 to 25.3, in the third; and from 16.5 to 23.9 in the fourth.

In the first quartile, two-thirds of the medians lie between 28.0 and 30.6, with a range of 2.6; in the second quartile, two-thirds of the medians lie between 24.1 and 26.6, with a range of 2.5; in the third, two-thirds of the medians lie between 22.6 and 23.6, with a range of 1.0; in the fourth, two-thirds of the medians lie between 19.1 and 22.3 with a range of 3.2.

VII

RELATIONSHIP BETWEEN ABILITY IN SPECIAL SUBJECTS AND THE AMOUNT OF PARTICIPATION IN THOSE SUBJECTS

The purpose of this portion of the study is to show the relationship existing between ability in special subjects and the amount of participating done in them.

The data are given in Table IX, which is arranged after the manner described in Part VI, except that the rank in special ability is substituted for the rank in general allround ability. Otherwise, the arrangement of the data, the method of finding the central tendency, and the method of expressing variation is precisely that used in Part VI.

For convenience in discussion, there is given in Table X the median measure for each subject. These medians are found from the individual percentages of the grades, ranking these measures in order of the amount of the percentage and without regard to grade. The median of each quartile represents, therefore, the median of all the percentages in that quartile in all grades, for one subject.

Those subjects which would be described as formal subjects and which adapt themselves most easily to mechanical treatment are, as shown in Table X, lowest in amount of reciting done by the best quartile and highest in amount of reciting done by the lowest quartile. In one case—phonics—the amount of reciting done by the best quartile is less than an equal share. On the other hand, those subjects which would be ordinarily described as content subjects and which to an increasing degree demand problematic thinking and appreciation, are found to be relatively high in the amount of reciting done by the best quartile and low in amount of reciting done by the poorest quartile. In the case of phonics, spelling, and mathematics, the distribution among the quartiles is remarkably even, the first quartile doing about the

TABLE IX. THE RELATIONSHIP BETWEEN ABILITY IN SPECIAL SUBJECTS AND THE AMOUNT OF RECITING DONE IN THEM, FOR INDIVIDUAL TEACHERS, BY GRADES

Teacher	No. of Records	No. of Pupils	Quartiles 1	2	3	4
READING AND LITERATURE						
GRADE I						
160	1	44	27.2	25.0	22.7	25.0
33	2	22	28.2	28.2	26.1	17.4
1	2	11	28.9	17.1	23.7	30.3
124	3	28	29.0	24.2	22.6	24.2
176	1	40	29.6	23.9	22.5	23.9
41	5	19	30.1	24.8	24.2	20.8
33	2	20	30.5	30.5	15.3	23.7
118	3	20	30.5	25.3	23.2	21.0
124	3	12	31.8	22.7	22.7	22.7
1	2	9	33.7	27.5	19.4	19.4
159	2	18	40.5	23.8	20.2	15.5
1	2	21	46.2	35.9	11.5	6.4
GRADE II						
34	2	20	22.4	32.8	21.6	23.2
39	5	19	22.8	23.2	36.4	17.5
34	3	23	24.2	29.0	24.2	22.6
162	1	34	24.5	24.5	22.6	28.3
177	1	28	25.8	29.3	24.1	20.7
125	1	35	25.9	20.2	27.9	25.9
2	2	23	29.3	21.3	22.5	26.9
66	3	12	29.7	29.7	15.6	25.0
102	2	30	29.7	25.0	21.1	24.2
186	1	23	30.4	33.9	25.9	9.8
209	1	7	31.1	33.8	22.9	12.1
2	2	22	35.7	35.7	15.2	11.6
206	2	12	39.1	20.9	24.5	15.5
103	2	25	40.8	20.8	5.0	33.3
204	1	15	42.7	31.8	13.2	12.3
ARITHMETIC AND MATHEMATICS						
GRADE I						
1	1	8	19.0	14.3	38.1	28.6
65	3	9	26.2	27.7	20.5	25.5
1	1	10	28.0	24.0	24.0	24.0
159	1	17	37.1	20.4	15.9	26.5
GRADE II						
125	1	35	13.2	13.2	40.1	33.5
34	1	41	19.7	23.9	27.1	29.3
177	1	29	22.7	24.2	27.3	25.8
103	2	26	28.6	21.4	23.2	26.8
205	2	14	31.7	28.5	20.4	19.3
66	3	13	32.4	37.8	13.8	15.9
39	3	18	39.3	21.3	15.6	23.7
GRADE III						
40	2	20	16.1	22.6	35.5	25.8
3	1	22	17.9	17.9	21.9	42.3
3	1	22	20.2	25.0	28.6	26.2
35	1	14	20.9	20.9	33.1	25.0
134	1	18	30.0	22.8	27.9	19.3
164	3	7	31.8	25.0	22.6	20.6
104	1	21	34.2	28.9	14.5	22.5
35	1	19	35.3	25.0	21.3	18.4
105	1	21	37.5	14.8	27.3	20.4
58	1	29	62.5	12.5	25.0	0.0
COMPOSITION AND GRAMMAR						
GRADE I						
159	1	18	16.7	58.3	8.3	16.7
124	1	12	25.0	50.0	0.0	25.0
124	1	28	60.0	20.0	10.0	10.0
GRADE II						
34	2	44	28.6	32.1	21.4	17.9
2	2	24	36.0	20.0	16.0	28.0
125	1	37	43.4	28.3	15.2	13.0
2	2	21	45.0	19.0	25.0	11.0
GRADE III						
69	3	16	23.9	21.6	29.5	25.0
70	3	12	26.0	19.5	32.5	22.0
3	1	22	28.5	23.8	23.8	23.8
58	2	29	29.0	51.0	11.0	9.0
35	1	31	37.5	18.7	31.3	12.5
40	4	20	39.2	31.6	11.4	17.7
178	1	36	46.7	40.0	13.3	0.0
GRADE IV						
179	1	28	21.4	36.1	23.4	19.1
141	1	12	23.8	23.8	33.3	19.0
180	1	30	31.5	20.8	23.8	23.8
4	1	20	32.2	32.2	22.6	12.9
4	1	21	44.6	23.2	16.1	16.1
HISTORY						
GRADE I						
159	1	18	46.2	15.3	23.1	15.4
GRADE III						
40	3	20	56.3	24.2	17.5	1.9
GRADE IV						
41	4	19	28.8	18.0	25.6	27.6
98	2	22	33.0	26.9	27.7	12.3
GRADE V						
5	1	23	22.1	34.9	19.7	23.2
170	1	42	23.1	20.0	30.0	26.9
169	1	34	27.3	34.5	21.4	16.7
5	1	23	29.3	29.3	31.8	9.5
42	2	20	30.4	28.6	17.8	23.2
217	1	11	44.2	21.2	16.3	18.3
43	1	20	53.0	16.7	18.2	12.1
GRADE VI						
6	1	25	21.5	23.8	27.3	27.3
43	2	20	30.1	24.7	20.5	24.7
75	3	19	30.6	24.1	30.8	14.5
127	1	20	30.8	23.1	15.3	30.8
110	1	22	32.6	28.3	21.7	17.4
6	1	19	35.2	22.2	27.8	14.8
61	2	28	35.5	37.1	17.7	9.7
110	1	29	44.0	22.0	15.5	18.5
127	2	23	48.8	9.7	30.6	11.1

TABLE IX. THE RELATIONSHIP BETWEEN ABILITY IN SPECIAL SUBJECTS AND THE AMOUNT OF RECITING DONE IN THEM, FOR INDIVIDUAL TEACHERS, BY GRADES—*Continued*

Teacher	No. of Records	No. of Pupils	Quartiles 1	2	3	4
READING AND LITERATURE						
GRADE III						
105	2	19	16.9	25.7	25.7	31.6
135	1	18	17.4	17.4	30.4	34.8
35	2	16	20.9	20.9	33.1	25.0
35	2	17	25.0	29.4	24.3	21.3
104	1	19	25.0	38.3	36.7	0.0
178	1	34	25.0	17.8	25.0	32.1
58	3	29	25.5	39.2	13.2	22.1
3	2	24	30.5	30.5	13.9	25.0
40	3	20	37.4	33.6	15.9	13.1
3	2	24	38.3	27.7	25.5	8.5
GRADE IV						
126	1	24	14.3	28.6	21.4	35.7
106	1	23	18.2	27.3	11.3	43.2
165	1	48	20.6	26.5	26.5	26.5
179	2	30	31.0	29.8	21.5	17.7
180	1	35	36.1	25.0	27.8	11.1
4	1	22	37.5	12.5	27.1	22.9
4	1	20	37.6	18.7	20.8	22.9
166	1	39	39.1	22.7	24.5	13.6
41	5	20	43.6	29.5	12.8	14.1
GRADE V						
167	1	46	25.0	32.4	17.6	25.0
184	1	42	25.0	30.8	23.1	21.1
5	1	22	31.8	22.7	30.3	15.2
42	4	20	40.0	28.9	15.5	15.5
181	1	40	42.2	17.7	8.9	31.1
170	1	41	43.5	19.6	19.0	17.8
ARITHMETIC AND MATHEMATICS						
GRADE IV						
4	1	20	20.6	20.6	38.2	20.6
71	3	21	20.8	29.2	22.9	27.0
126	1	15	20.8	20.8	31.9	26.4
107	1	24	23.5	47.1	5.9	23.5
4	1	21	24.0	20.2	20.2	35.5
126	1	23	24.1	27.8	30.5	17.6
179	1	30	28.3	31.7	30.0	10.0
144	1	13	31.7	18.3	28.8	21.2
182	1	23	33.3	33.3	19.0	14.3
180	1	31	42.6	24.1	22.2	11.1
GRADE V						
73	3	14	17.7	25.8	35.8	20.6
81	1	40	19.5	31.7	14.6	34.1
74	3	15	27.4	26.7	18.5	27.4
5	1	22	33.3	33.3	0.0	33.3
184	1	42	34.1	26.8	18.3	20.7
5	1	25	35.9	33.7	13.0	17.3
GRADE VI						
110	1	23	11.5	29.5	30.5	28.5
127	1	21	15.4	15.4	38.5	30.7
127	1	20	17.6	41.2	17.6	23.5
6	1	19	22.7	18.8	25.9	32.5
91	2	13	23.7	24.6	24.6	27.1
93	2	18	27.5	24.2	28.3	20.0
6	1	25	28.0	20.8	19.0	32.1
61	1	25	36.2	32.2	17.8	13.8
43	1	20	37.8	44.9	8.6	8.6
182	1	38	47.1	17.6	8.8	26.5
COMPOSITION AND GRAMMAR						
GRADE V						
5	1	22	12.5	16.7	37.5	33.3
42	2	20	21.7	17.4	43.5	17.4
119	3	29	27.1	18.7	27.1	27.1
108	1	29	30.3	26.3	28.6	14.3
168	2	46	33.1	24.8	22.3	19.8
5	1	25	33.3	16.6	38.1	11.9
GRADE VI						
110	1	22	23.9	21.8	22.8	31.5
43	9	20	28.4	22.3	26.2	23.1
6	1	25	32.1	17.8	33.6	16.4
6	1	19	35.6	24.0	18.2	22.1
GRADE VII						
62	1	27	15.3	21.6	23.3	39.7
190	1	22	27.8	16.6	27.8	27.8
62	2	26	28.3	24.5	30.2	16.9
8	1	20	34.6	48.3	13.8	3.4
8	1	23	37.7	22.4	26.9	13.1
44	1	20	43.9	25.7	15.2	15.2
GRADE VIII						
210	2	31	25.8	33.4	22.7	18.1
45	3	19	32.2	36.3	14.8	16.6
8	1	36	50.0	23.7	13.1	13.1
8	1	37	50.7	25.0	18.9	5.4
GEOGRAPHY						
GRADE III						
104	1	20	50.0	21.4	7.1	21.4
136	1	14	56.4	20.5	15.4	7.7
HISTORY						
GRADE VII						
190	1	22	24.4	24.4	22.1	29.1
7	1	20	32.3	22.6	25.8	19.3
44	1	21	37.5	50.0	12.5	0.0
9	1	24	42.3	34.6	15.4	7.7
GRADE VIII						
95	1	36	28.0	28.0	24.0	20.0
185	1	24	30.7	23.1	23.1	23.1
9	1	36	34.9	45.5	12.1	7.4
45	5	19	51.4	19.3	13.8	13.4
121	4	20	59.2	25.4	5.6	9.8
9	1	35	62.2	16.8	9.3	11.6
GRADES X–XII						
81	2	16	25.6	26.7	27.9	19.8
211	4	25	30.5	25.0	27.7	16.8
23	1	12	31.3	18.8	17.1	32.8
28	2	25	33.3	28.8	23.4	14.4
28	1	19	33.5	18.9	25.6	21.9
20	4	26	41.3	21.5	25.0	12.3
28	1	16	46.3	22.2	14.8	16.6
122	3	20	67.2	11.2	18.6	2.9
SPELLING						
GRADE II						
161	1	44	14.3	28.6	23.8	33.3
161	1	42	23.4	23.4	19.4	33.7
186	1	24	24.1	24.1	24.1	27.7
2	1	24	27.3	36.3	18.2	18.2
2	1	21	44.4	0.0	41.7	13.9

TABLE IX. THE RELATIONSHIP BETWEEN ABILITY IN SPECIAL SUBJECTS AND THE AMOUNT OF RECITING DONE IN THEM, FOR INDIVIDUAL TEACHERS, BY GRADES—*Continued*

Teacher	No. of Records	No. of Pupils	Quartiles 1	2	3	4
READING AND LITERATURE						
GRADE VI						
43	3	20	28.4	21.6	26.6	23.3
127	1	21	28.6	28.6	25.0	17.8
182	1	38	29.1	16.6	35.4	18.8
127	1	21	31.3	12.5	25.0	31.2
6	1	25	40.0	22.8	17.1	20.0
6	1	19	45.6	23.9	14.1	16.3
GRADE VII						
7	1	19	28.3	28.3	24.6	18.7
44	2	21	40.1	23.3	18.8	17.8
GRADE VIII						
8	1	35	30.4	16.0	19.0	34.5
95	2	34	36.7	19.5	25.8	18.0
8	1	37	37.1	26.4	23.0	13.5
45	3	19	62.9	18.6	11.6	7.0
GRADES IX–XII						
24	1	21	11.1	55.5	27.7	5.6
31	1	13	25.9	20.7	28.4	25.0
120	3	16	26.7	31.0	28.6	13.7
12	1	27	30.4	14.2	17.8	37.5
86	2	20	30.9	28.2	20.8	20.1
214	1	27	31.3	45.5	6.2	16.9
29	1	21	33.1	16.9	27.9	22.1
18	1	26	33.3	31.0	33.3	2.4
13	1	24	37.9	23.0	21.8	17.2
15	1	24	39.2	25.0	25.0	10.8
29	1	27	40.0	17.7	26.1	16.1
11	3	22	41.4	23.9	22.7	11.9
123	2	16	41.9	25.2	15.5	17.4
123	1	22	42.0	32.0	20.0	6.0
15	2	24	42.9	26.9	20.6	9.5
15	1	28	50.0	22.2	16.6	11.1
ARITHMETIC AND MATHEMATICS						
GRADE VII						
10	1	19	19.0	16.4	28.4	36.8
77	3	16	21.5	26.9	24.6	26.9
10	1	22	27.2	23.4	22.2	27.2
76	3	18	27.9	26.0	29.8	16.2
62	3	28	30.2	24.7	20.9	24.1
189	1	22	32.9	40.8	23.7	2.6
44	8	21	40.9	21.2	22.2	15.6
GRADE VIII						
183	1	28	17.6	35.3	35.3	11.7
84	3	25	20.7	20.7	30.4	28.2
183	2	24	26.2	28.1	22.3	23.3
80	3	11	26.9	20.0	29.6	23.5
10	1	36	31.6	27.6	16.3	24.5
45	9	19	39.9	25.2	14.4	20.4
10	1	36	50.0	30.0	17.5	2.5
GRADES IX–XII						
12	1	22	20.8	22.5	25.0	31.7
21	2	18	22.3	37.7	21.9	18.1
218	3	26	25.0	25.0	25.0	25.0
12	1	23	26.3	18.2	20.9	34.5
97	2	18	27.6	27.6	25.2	19.5
215	1	12	28.6	21.4	21.4	28.6
17	1	14	29.2	38.8	20.7	11.2
26	1	19	29.7	26.5	23.4	20.3
17	1	15	38.2	23.0	14.8	23.9
MUSIC						
GRADE I						
124	2	31	11.1	33.3	36.1	19.4
124	2	14	33.3	33.3	33.3	0.0
48	1	20	44.7	21.1	23.7	10.5
33	1	41	78.1	9.4	12.5	0.0
GEOGRAPHY						
GRADE IV						
126	1	22	9.6	25.0	40.4	25.0
4	1	20	24.4	33.3	24.4	17.8
4	1	21	28.8	28.8	18.2	24.2
106	2	23	28.8	10.0	30.6	30.6
41	4	19	28.8	18.0	25.6	27.6
143	1	14	32.8	32.8	17.2	17.2
104	2	24	33.3	25.6	23.1	17.9
72	3	22	35.9	27.5	16.9	19.7
GRADE V						
82	3	16	18.1	27.8	31.9	22.2
5	1	25	20.1	40.9	17.4	21.5
5	1	22	25.0	25.0	28.8	21.2
108	2	30	27.5	25.0	13.8	33.7
90	2	30	28.6	32.9	19.7	18.8
42	2	20	32.9	22.4	21.0	23.7
108	1	26	71.1	0.0	15.8	13.1
GRADE VI						
83	3	25	18.4	26.5	34.3	20.7
127	1	21	20.2	46.4	14.3	19.0
171	1	41	28.7	19.7	30.3	21.3
110	2	23	28.8	28.8	25.6	16.7
173	1	37	30.7	17.0	35.2	17.0
43	10	20	34.4	25.5	20.3	19.7
6	1	19	35.3	22.3	23.4	19.0
172	1	41	36.7	21.8	20.2	21.2
175	1	40	37.5	19.4	27.7	15.3
6	1	25	40.2	31.5	17.4	10.8
SPELLING						
GRADE III						
164	1	35	25.7	26.4	23.9	23.9
178	1	41	26.7	24.0	22.6	26.7
162	1	30	29.4	35.3	23.5	11.7
137	1	14	35.0	25.0	10.0	30.0
163	1	43	36.5	26.0	17.7	19.8
GRADE IV						
139	1	15	15.9	27.3	26.1	30.7
126	1	15	20.8	34.7	23.6	20.8
165	1	48	22.7	25.0	29.5	22.7
126	1	22	28.8	16.7	28.8	25.7
107	1	23	50.0	13.6	13.6	22.7
GRADE V						
181	1	39	27.5	21.0	25.0	26.4
184	1	47	27.9	27.1	23.3	21.6
108	1	26	30.5	23.7	22.0	23.7
GRADE VI						
182	1	38	23.3	29.7	31.3	15.6
43	3	20	25.2	21.9	26.4	26.4
186	1	29	28.2	23.4	24.6	23.8
174	1	41	34.2	18.2	22.3	25.0
GRADE VII						
62	1	27	14.8	20.4	16.7	48.1
GRADE VIII						
45	1	19	43.0	18.1	27.7	11.1

TABLE IX. THE RELATIONSHIP BETWEEN ABILITY IN SPECIAL SUBJECTS AND THE AMOUNT OF RECITING DONE IN THEM, FOR INDIVIDUAL TEACHERS, BY GRADES—*Continued*

Teacher	No. of Records	No. of Pupils	Quartiles 1	2	3	4
SCIENCE						
GRADE V—NATURE						
108	1	29	35.7	42.9	10.7	10.7
GRADE VII—PHYSIOLOGY						
10	1	17	22.5	29.2	17.5	30.8
GRADE VIII						
10	1	35	28.8	32.7	11.2	27.3
10	1	34	30.6	25.0	25.0	19.4
GRADE IX—AGRICULTURE						
16	1	24	60.6	9.1	3.0	27.3
GRADE XI—CHEMISTRY						
27	1	6	42.1	10.5	23.7	23.7
GRADE XII—CHEMISTRY						
30	1	18	26.2	23.7	25.0	25.0
GRADE XII—PHYSICS						
212	2	9	47.3	23.3	16.0	13.3
MIXED GRADE—FOOD CHEMISTRY						
27	3	18	40.8	26.1	17.6	15.4
MUSIC						
GRADE II						
34	1	43	42.2	20.3	20.3	17.1
176	1	29	46.1	7.7	7.7	38.5
39	3	20	48.4	16.1	12.9	22.6
GRADE III						
104	1	21	33.3	4.2	27.1	35.4
GRADE IV						
126	1	24	28.6	25.0	32.1	14.3
126	1	15	44.2	13.5	36.5	5.8
LANGUAGES						
GRADE IX—GERMAN						
14	1	27	29.8	28.7	17.0	24.4
14	3	25	30.0	28.1	18.4	23.4
GRADE X						
19	1	21	27.6	25.5	29.7	17.2
GRADE X—LATIN						
22	1	10	33.9	22.4	23.7	19.9
GRADE XII						
216	1	15	18.8	31.2	26.3	23.7
216	1	17	22.4	25.0	30.1	22.4
32	1	14	39.3	25.0	32.1	3.6
GEOGRAPHY						
GRADE VII						
78	3	24	28.5	34.2	23.0	14.2
190	1	22	29.1	19.8	30.2	20.9
62	18	25	30.7	26.1	21.2	21.9
7	1	19	32.1	30.7	25.0	12.1
7	1	23	38.9	29.4	16.3	15.4
144	2	21	44.6	31.7	14.9	8.8
GRADE VIII						
7	1	37	20.2	44.0	21.4	14.3
7	1	35	25.0	19.6	34.8	20.5
79	3	16	27.3	18.8	31.8	22.0
45	3	19	43.7	15.1	19.2	21.9
PHONICS						
GRADE I						
124	1	12	24.1	20.7	27.6	27.6
33	1	20	25.0	15.0	20.0	40.0
124	1	27	25.6	21.7	26.3	26.3
33	1	18	27.7	16.7	33.3	22.2
159	1	18	62.5	12.5	12.5	12.5
GRADE II						
125	1	36	0.0	13.3	40.0	46.6
161	1	40	19.8	27.8	23.3	29.1
162	1	37	29.7	22.4	25.4	22.4
177	1	29	30.2	28.1	28.1	13.5
GRADE III						
163	1	40	22.6	25.8	29.0	22.6
138	1	18	23.0	23.0	38.5	15.4
164	1	38	48.5	25.0	14.7	11.8
GRADE V						
167	1	46	14.7	12.7	34.3	38.2
170	1	41	22.5	22.5	15.6	39.3
INDUSTRIAL AND SOCIAL LIFE						
GRADE I						
38	3	20	42.2	28.6	19.9	9.2
193	2	12	49.3	28.2	5.6	16.8
GRADE II						
39	1	19	32.2	38.7	19.3	9.7
193	2	12	48.3	.9	30.1	20.7
GRADE III						
40	5	20	32.6	20.8	20.5	26.1
GRADE IV						
41	3	20	32.6	24.3	15.3	27.7
191	1	15	36.6	29.1	19.4	14.8
GRADE V						
192	2	10	27.3	5.5	30.9	36.3
42	4	20	44.1	13.1	24.8	18.0
GRADE VI						
192	2	22	37.1	24.5	16.5	21.8
GRADE VII						
194	3	13	39.5	14.6	25.6	20.2
GRADE VIII						
56	3	19	42.2	23.6	24.2	9.9
54	3	20	49.4	16.5	19.4	14.7
55	2	17	51.4	23.9	5.7	19.0
50	1	19	58.6	18.5	20.0	2.8

This table should be read as follows: In the class in literature of grade I (teacher 160) consisting of 44 pupils, and for which 1 record was made, the highest quartile in ability did 27.2% of the total reciting done by the class, the second quartile in ability, 25.0%; the third quartile, 22.7%; and the fourth quartile, 25.0%, etc.

same proportion of the total reciting as the fourth quartile in the case of phonics, and only slightly more in spelling and in mathematics. In geography, science, and literature, the first quartile does about one and one-half times as much reciting as does the fourth quartile. In English composition, history, social and industrial life, and in music, the distribution is very uneven, the first quartile doing from one and four-fifths to two and three-fourths as much reciting as does the fourth quartile.

The percentages for School IV and School XVI (teachers

TABLE X

MEDIANS FOR SPECIAL SUBJECTS. ALL GRADES COMBINED

SUBJECT	GRADE	1ST QUAR.	2ND QUAR.	3RD QUAR.	4TH QUAR.
Phonics.....	1–5	24.6	22.1	27.0	24.5
Spelling.....	1–8	27.4	24.1	23.7	23.9
Mathematics...	1–12	27.6	24.9	22.8	23.8
Languages.....	9–12	29.8	25.5	26.3	22.4
Geography.....	3–8	29.1	25.5	21.4	19.7
Reading and Literature...	1–12	30.5	25.0	22.7	19.7
Composition and Grammar....	1–8	31.5	23.8	22.8	17.4
History.....	1–12	33.2	24.0	21.6	16.7
Science.....	1–12	35.7	25.0	17.5	23.7
Music.....	1–8	43.2	18.2	25.4	15.7

38 to 56, and 191 to 194) should be noted here. These schools are attempting to make the course of study represent the most important activities of life outside the school and to provide in the fullest manner for the child's participation in and appreciation of these activities. Special stress is laid upon providing for initiative on the part of the pupil. The percentages for the teachers in these schools are almost uniformly above the median measures of the grade and subject in which they are found, for the first quartile, and below the medians for the fourth quartile. This is true also of the distributions in Tables I and V. The significance of this fact will be pointed out in Part VIII.

The same general tendency for the percentages to grow larger for the first quartile and lower for the fourth quartile, with an advance in grade, which was pointed out in Parts V and VI, may be noticed in the case of special subjects, although the lack of a larger number of records prevents its being shown so clearly.

The measure of variability used in this section is the same

as that used in Part VI, Q_1 being used to represent the distance between the median and the 25 percentile; Q_2, the distance between the median and the 75 percentile. These variations are given in Table XI, which follows.

TABLE XI

Subject	1		2		3		4	
	Q_1	Q_2	Q_1	Q_2	Q_1	Q_2	Q_1	Q_2
Mathematics	6.8	5.7	4.2	4.0	4.3	5.6	4.5	3.4
Composition and Grammar	5.7	6.2	3.8	4.5	7.6	4.3	4.4	4.7
Reading and Literature	4.2	8.6	3.9	4.6	5.0	2.9	5.7	5.3
History	3.1	11.0	4.0	4.3	5.3	4.2	5.1	6.4
Geography	1.8	6.8	5.7	6.2	4.0	7.4	3.0	2.2
Spelling	4.0	5.0	3.4	3.1	3.0	2.6	3.6	3.3
Phonics	2.1	5.1	7.1	2.9	7.0	6.3	9.1	3.7
Languages	7.4	4.1	.5	3.2	7.9	3.8	5.2	1.3
Science	6.9	6.4	1.7	4.2	6.3	6.2	8.3	3.6
Music	9.9	2.9	8.8	6.8	12.5	7.9	9.9	6.9
Social and Industrial Life	9.6	7.1	9.0	4.6	3.4	4.3	8.1	3.8

As in Parts V and VI, the variation above the median in quartiles 1 and 2 tends to be greater than the variation below it, while in quartiles 3 and 4 the reverse is true. In general, the variation is greatest in those subjects which are least adaptable for formal methods of teaching. Those subjects which are highest in the amount of reciting done by the first quartile are in general highest in the amount of variation above the median; those which are lowest in the amount of reciting done by the fourth quartile are highest in the amount of variations below the median. The second and third quartiles show less variation than the first and fourth.

The medians, variability, and quartile percentages have been given in the preceding portion of this part of the study for subjects for which the data are perhaps not extensive enough to warrant conclusive generalization. These data are all that were available for these subjects at the time of the publication of this study, and are given in order that those who may care to do so may supplement them by taking additional records. Those subjects in which records were marked for less than twenty teachers are given below, with a summary of the extent of the data for each:

Subject	Number of Teachers	Number of Classes	Number of Records
Languages	5	7	9
Science	6	9	12
Music	8	10	14
Phonics	12	14	14
Social and Industrial Life	13	12	37

The manner in which the tendencies shown by these data agree with those shown in the case of subjects for which the data are more extensive renders it unlikely that the central tendencies which would be computed from a greater number of records would vary greatly from those given.

VIII

EDUCATIONAL IMPLICATIONS

It is the purpose of this part of the study to summarize the facts given in the preceding section, to give a further interpretation of these facts, and to trace some of the more important educational implications.

The Gross Inequality: The opportunity for participation in the activities of the school is not equably distributed, the fourth of the class doing most reciting participating about four times as much as does the fourth of the class doing least reciting. The percentages of a pro-rata share of reciting are 162.0, 110.4, 80.4, 46.8. The influence of differences in ability is not sufficient to wholly explain this inequality, which is uniformly greater than that found in the distributions according to ability. Other factors contribute to bring about this increase, of which the most important are differences among the pupils in initiative, aggressiveness, talkativeness and attractiveness of personality. Data organized with the rank in these qualities substituted for that in ability show that in the case of each of these qualities the amount of the reciting done by the fourth of the class ranking highest in the quality, is greater than that done by the fourth of the class ranking lowest in the quality. This inequality is far less, however, than has been commonly supposed.

Relationship Between General All-round Ability and Amount of Participation: The pupils who are ranked highest by the teacher in general all-round ability, participate more in the activities of the school than do those who are ranked lower; the best fourth doing about one and two-fifths as much reciting as the poorest fourth, the second fourth doing slightly more than an equal share, and the third fourth slightly less than an equal share. The inequality shown by these data is far lower than commonly supposed. What inequality exists is probably due

to the following factors: 1. Pupils who are most competent, in general, desire most to participate. 2. Those who wish most to participate tend to get to do it. 3. The teacher feels the necessity of getting things done and so accepts the more ready and satisfactory answers of the bright pupils. 4. Human nature avoids error if possible, i.e., it is more pleasant to receive adequate contributions from pupils than those which are inadequate or incorrect.

It is significant that in schools IV and XVI the percentages representing the amount of reciting done by the first quartile should be uniformly above the median for all schools. It seems clear from this that the adoption of the modern conceptions in education carries with it the necessity of facing anew the detailed problems of method and of class management. It is certain, for example, that the teacher who has for her ideal the development of initiative on the part of the pupils will have greater difficulty in controlling the distribution of opportunity for participation among her pupils.

While it is true that the median percentage for each grade much more nearly approaches the pro-rata share for each quartile than has commonly been supposed, it should be pointed out that the large number of teachers shown by the data to have an inequality of distribution above the 75 percentile must constitute a special problem. It is these unusual cases which must receive the attention of the supervisor.

Inequality of Distribution by Subjects. It is especially significant that the greatest equality of distribution should lie with those subjects which are most adaptable for formal treatment and pure memory work. For the most part, these subjects have been long in the curriculum, so that teachers through a period of many hundred years, have perfected and handed down mechanical procedures and devices for securing an equable distribution. In such cases, systems (such as card rolls, calling on the pupils by seats, in rows, or alphabetically) can be readily used. Subjects in which appreciation has to be developed or in which problems have to be sensed and solved, are not adaptable for such treatment. Appreciation and thinking cannot be ordered alphabetically, nor by rows, nor by card indexes. It is not strange, therefore, that subjects which have a problematic organization or which demand appreciation are shown by Table X to have the

greatest inequality of distribution. With the modern tendency to increase the amount of problematic organization in the curriculum; to demand that the course of study be tied up with life outside the school; to insist that the pupil make out his own problems, and that he develop aesthetic and ethical appreciation; the problem becomes increasingly important. That we have not reached a satisfactory solution is evidenced by the fact that the two schools which are perhaps among the foremost of the country in setting up these new standards (schools IV and XVI) are among those in which the inequality of distribution of opportunity for participation is greatest.

The Increase in Inequality With an Advance in Grade: The tendency for the inequality in distribution to grow greater with an advance in grade, seems to be an effect of the following causes: (1) With an advance in grade the subject matter grows more difficult and more interesting to the teacher, so that there is an increasing tendency for it to occupy the attention of the teacher to the exclusion of the problems of class procedure. (2) With an advance in grade, the greater age of the pupil makes him more able to make his personality felt, so that he may control class procedure to an increasing degree. (3) He is more and more concerned with the content, and less with getting the mere tools of knowledge. This seems to be the influence, for example, which makes the percentage done by the best quartile in reading less, proportionately, in the lower grades than in the more advanced grades where the tools of reading are better in hand and the attention is more directed to the content of what he reads.

To project solutions for these difficulties is not within the scope and province of this study. Its purpose has been fulfilled if it has described the practice with regard to the distribution of opportunity for participation, and has pointed out for this problem, the implications and significance of the modern demands for functional and problematic teaching.

APPENDIX

In the effort to estimate the reliability of percentages computed from a small number of records, the amount of reciting done by each quartile was computed from the first two records, according to date, of classes for which there were six or more records. The percentages representing the first and fourth quartiles, were then compared with the corresponding quartile percentages which had been found from the whole number of records. The two sets of percentages are given below:

	Highest Quartile		Lowest Quartile	
Teacher Grade 1–8	2 Records	6 or More Records	2 Records	6 or More Records
38	40.1	39.5	8.6	11.8
124	30.4	34.0	19.6	15.2
124	31.6	31.5	19.7	17.1
128	55.5	44.1	6.9	7.8
2	37.8	40.2	15.5	11.9
39	57.9	40.8	3.4	6.7
2	52.7	44.8	4.1	10.6
125	32.9	41.2	14.9	10.4
2	51.8	44.9	4.0	8.2
58	60.0	40.2	0.0	10.4
40	62.4	40.4	0.0	10.3
126	54.5	43.5	0.0	12.7
41	44.0	44.6	8.6	7.9
42	42.8	41.6	15.1	12.0
5	43.1	38.8	4.8	13.8
43	37.8	34.5	17.2	18.0
7	49.7	36.6	11.2	14.9
44	56.5	47.2	4.9	10.0
62	62.4	39.3	6.0	13.1
45	67.3	50.4	4.5	9.0
7	62.4	46.8	9.2	8.9
7	42.2	40.7	11.5	9.2

The quartile percentages found from all the records were subtracted from those found from two records only. The differences resulting were arranged in order, placing the largest minus difference at the low end and the largest plus difference at the high end. The median of the differences so arranged is plus 7.4 for the first quartile and minus 3.3 for the fourth quartile. In the case of these 22 classes, therefore, the effect of

finding the percentages from two records only is to raise the percentages in the first quartile 7.4 and to lower the percentage in the fourth quartile 3.3. This is strangely inconsistent with the results shown in Part V, since it should be expected that casting out small records should have lowered the median for the first quartile and raised the median for the fourth, whereas the opposite was true. The only explanation for this inconsistency is the great number of factors which may enter to render percentages representing a small number of records unreliable. The chief of these are as follows:

1. The pupils represented by a small number of records as doing most reciting may not be the pupils who really would be shown to do most reciting by a greater number of records.

2. If the teacher is subject to an influence which makes for an inequality of distribution, it cannot be certain from a small number of records:

   a. That this influence operated,
   b. That it did not operate more than usual.

3. Because of limitations due to fixed class periods, it seems probable that certain pupils may be neglected for one or two recitations. This would, of course, lower the percentage representing the amount of reciting done by the low quartile, and raise the percentage representing the amount of reciting done by the high quartile. It is obvious, however, that these pupils are not neglected indefinitely so that if more records were taken, the percentage for the low quartile would tend to be raised, and the percentage for the high quartile, lowered.

4. It may be possible that the two records represent very formal procedure on the part of the teacher, such as would be found in a drill lesson in Arithmetic, where pupils are called upon in turn.

Very obviously, some of these influences would tend to lower the percentages representing the amount of reciting done by the first quartile and to raise the percentages representing the amount of reciting done by the fourth quartile; while others would have the opposite effect. It is impossible to tell, however, from the data at hand, which of these influences has operated in the case of any given percentage.

It seems very improbable that these influences should have

operated by chance in the case of the 22 classes given above in such a manner as to effect the change noted, while at the same time, and by the same chance combination, they should have combined so as to have no effect in fixing the medians in Table 1.

Under the circumstances, it seems that the evidence is against the true medians being higher for the first quartile and lower for the fourth quartile than those given in Table 2, while there is some reason for believing that the true medians may be somewhat lower for the first quartile and higher for the fourth quartile, than those given in this table.